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International Economic Analysis and Prospects

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Are High Real Interest Rates Bad for World Economic Growth?

Nemat Shafik
and
Jalaleddin Jalali

The conventional wisdom says yes. But close examination suggests the answer is not nearly so clear-cut.

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This paper — a product of the International Economic Analysis and Prospects Division, International Economics Department — is part of a larger effort in PRE to understand the linkages between the world economy and the development process. This paper was written as background to a larger report by the International Economics Department entitled *Global Economic Prospects and the Developing Countries*.. Copies are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Mila Divino, room S8-218, extension 33739 (33 pages, with figures and tables).

There is a conventional perception that high real interest rates are bad for economic growth. However, Shafik and Jalali show that close examination of the experience over the last 40 years undermines the existence of such a relationship. For much of the 1950-79 period, ex-post real interest rates were less than the growth rate of income in the major economies, whereas the 1980s were a period of rapid growth in the world economy that coincided with unprecedentedly high real interest rates.

Shafik and Jalali review the competing explanations for the high real interest rates of the 1980s. These explanations include the U.S. budget deficit, restrictive monetary policies in the OECD, a decline in global savings, a boom in investment, and higher risk premia. The merits of each explanation are reviewed in light of the empirical evidence.

The authors stress that the critical question is whether real interest rates have had an adverse effect on economic growth, not why they have been high in the recent past. To test this, the literature on cointegration is used to explore whether world interest rates and growth rates equilibrate in the long run. The econometric evidence disputes the view that high interest rates are associated with low economic growth in the industrial countries. This would seem to support the view that the high interest rates that prevailed during the 1980s were the result of increased profitability or improved investment efficiency.

For the low- and middle-income countries, the relationship between interest rates and growth is ambiguous. High real interest rates will probably adversely affect developing countries that are highly indebted at variable interest rates and those that need to borrow further. However, developing countries that are outward-oriented may be able to profit from increased exports as a result of rapid growth in the industrial countries.

What does this analysis imply for the consequences of high real interest rates in the future? One implication is that high real interest rates may not matter for growth performance if more productive investment results. If there is a negative impact of higher interest rates on growth, it will probably affect developing countries more. This is not simply because the low- and middle-income countries are net debtors; it seems also to reflect the differing structural characteristics of industrial and developing economies. Further research might consider the role of human capital and institutional constraints in determining the ambiguous relationship between world interest rates and growth in the developing countries.

Produced by the PRE Dissemination Center

Are High Real Interest Rates Bad for World Economic Growth?

by
Nemat Shafik
and
Jalaleddin Jalali*

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e High Real Interest Rates Bad for World Economic Growth?

1. Introduction

The perceived existence of a negative relationship between interest rates and growth is one that pervades much of economic thinking. However, the evolution of the world economy over the past forty years has apparently defied the existence of such a relationship. For much of the 1950-79 period, ex-post real interest rates were less than the growth rate of income in the major economies, as shown in table 1. In contrast, the latter half of the 1980s were a period of relatively rapid growth in the industrial countries which coincided with unprecedently high real interest rates.

An alternative view is that high interest rates are associated with periods of rapid growth because of improved resource allocation and increased productivity.[1] Thus high real interest rates may be a reflection of growing investment opportunities and increasing returns because of externalities and therefore are consistent with rapid growth.[2] On the other hand, these increasing returns seem to be largely in the OECD and in some of the newly industrializing countries where the stock of human capital is greater and the institutional structure facilitates technological change.

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[1] This is the reason why authors such as McKinnon (1973) and Shaw (1973) have advocated financial liberalization and higher real interest rates in developing countries. However, they also argue that the level of investment will be higher with increases in real interest rates because of the elimination of credit rationing as a result of greater savings mobilization. For cross-country evidence on the relationship between interest rates and growth in developing countries, see Gelb (1989).

[2] This would be consistent with the new growth literature which finds increasing returns to investment. See Romer (1986), Lucas (1988), and Scott (1989).

TABLE 1: LONG-TERM DEFLATED INTEREST RATES(*) AND INCOME GROWTH RATES IN G-7 COUNTRIES

YEAR	1951-54	1955-59	1960-73	1974-79	1980-84	1985-89
USA						
REAL INCOME GROWTH RATE	4.2	2.9	3.8	2.5	2.0	3.5
INFLATION RATE	2.4	3.0	3.6	8.0	6.6	3.2
INTEREST RATE	2.0	3.3	5.1	7.8	12.3	8.2
DEFLATED INTEREST RATE	-0.3	0.3	1.5	-0.2	5.3	4.9
JAPAN			66-73			85-88
REAL INCOME GROWTH RATE	NA	7.6	9.4	3.6	3.9	4.4
INFLATION RATE	NA	2.8	5.9	8.2	2.2	0.9
INTEREST RATE	NA	NA	6.3	8.0	8.0	4.9
DEFLATED INTEREST RATE	NA	NA	0.4	0.1	5.7	4.0
GERMANY			61-73			
REAL INCOME GROWTH RATE	NA	NA	4.4	2.6	1.1	2.7
INFLATION RATE	NA	NA	4.4	4.8	3.7	2.2
INTEREST RATE	NA	NA	7.2	7.7	8.7	6.4
DEFLATED INTEREST RATE	NA	NA	2.7	2.8	4.8	4.1
UK						85-87
REAL INCOME GROWTH RATE	2.9	2.3	3.3	1.5	0.8	3.0
INFLATION RATE	5.3	3.9	4.8	16.1	9.7	3.1
INTEREST RATE	3.8	5.1	7.4	13.6	12.6	7.5
DEFLATED INTEREST RATE	-1.3	1.2	2.5	-1.9	2.9	4.2
FRANCE						
REAL INCOME GROWTH RATE	4.1	5.4	5.7	3.0	1.5	2.8
INFLATION RATE	8.2	5.1	4.9	10.7	10.3	4.0
INTEREST RATE	5.7	5.5	6.2	9.5	14.1	9.3
DEFLATED INTEREST RATE	-1.9	0.5	1.3	-1.0	3.5	5.1
ITALY			61-73			
REAL INCOME GROWTH RATE	NA	NA	5.3	3.7	1.9	3.1
INFLATION RATE	NA	NA	6.1	17.1	16.4	7.0
INTEREST RATE	6.0	6.4	7.0	12.8	18.1	10.8
DEFLATED INTEREST RATE	NA	NA	0.9	-3.6	1.5	3.6
CANADA						85-88
REAL INCOME GROWTH RATE	4.5	5.3	5.3	4.0	2.2	4.3
INFLATION RATE	4.3	2.0	3.7	9.2	7.6	3.4
INTEREST RATE	3.0	3.9	5.6	8.6	12.9	9.7
DEFLATED INTEREST RATE	-1.1	1.9	1.9	-0.5	4.9	6.1

NOTE: PERIOD RATES ARE SIMPLE (ARITHMETIC) AVERAGES OVER THE PERIOD.

SOURCE: IFS. INTEREST RATES REFER TO THE FOLLOWING LINES OF THE IFS:
USA: LINE 61A (3 YR GOVT. BOND YIELD); JAPAN: 61 (GOVT. BOND YIELD);
GERMANY: 61 (PUBLIC AUTHORITIES BOND YIELD); UK: 61 (LONG TERM GOVT. BOND YIELD);
FRANCE: 61 ("MOYMENS" GOVT. BOND YIELD); ITALY: 61 (GOVT. BOND YIELD); AND
CANADA: 61A (3-5 YR GOVT. BOND YIELD)

(*): "DEFLATED INTEREST RATES" REFER TO EX-POST INTEREST RATES WHICH HAVE BEEN DEFLATED BY ACTUAL INFLATION RATES. THIS IS DISTINCT FROM "REAL INTEREST RATES" REFERRED TO IN THE TEXT WHICH USE EX-POST FUTURE INFLATION RATES AS THE DEFLATOR BASED ON THE ASSUMPTION OF PERFECT FORESIGHT.

Thus, there may be a different relationship between growth and interest rates in industrial and developing countries. This may be a partial explanation for the "de-linking" of OECD growth from developing countries growth observed in the world economy during the 1980s.

This paper briefly surveys some of the competing explanations about the level of real world interest rates. Both the industrial countries and the developing countries are considered as well as the United States on its own since relative size gives it a greater weight in determining world market outcomes. Thereafter, an empirical analysis is conducted to test whether real interest rates and growth rates equilibrate in the long run for both the industrial and developing countries using the recent literature on cointegration. This will shed some light on the question of whether concern over the perceived high real rates of interest is justified and give some indication as to the differential consequences for industrial and developing countries.

2. Explanations for High Real Interest Rates in the 1980s

The high real rates of interest that prevailed in the 1980s have been attributed to the U.S. budget deficit, restrictive monetary policies in the OECD, a decline in global savings, a boom in investment, and higher risk premia. These competing explanations will be surveyed below.

2.1 United States Budget Deficit

The U.S. fiscal deficit was a plausible contributing factor to the high interest rates of the early 1980s. Conventionally, it was argued that borrowing by the U.S. on world markets drove up interest

rates at the expense of developing country borrowers. However, although the U.S. budget deficit remains large, its value as a share of GDP has fallen from 6% in 1983 to 2.7% in 1989. Table 2 shows government deficits as a share of GDP for the G-7 where the same pattern can be observed. The fiscal deficit as a share of GDP for the G-7 as a whole has declined from a high of 5.6% in 1983 to 2.4% in 1989, the lowest level of the decade. Thus, further explanations are needed to explain the persistent high real interest rates throughout the 1980s.

Worries about the future financing of the U.S. budget deficit may be fueling inflationary expectations and contributing to higher nominal interest rates. During the 1980s, such fears apparently were not prevalent as evidenced by the behavior of the US dollar. If agents expected that U.S. deficits would be monetized in the future, the dollar would have depreciated, rather than appreciate as it did during much of the 1980s.[3] Therefore, the empirical evidence does not support a clear relationship between sizable fiscal deficits and high interest rates. However, the recent real depreciation of the dollar combined with the prolonged deliberations over the deficit reduction package in the US Congress may have raised inflationary expectations.

2.2 Tight Monetary Policies in the OECD

Concern about inflation was a major factor influencing monetary policies in the G-7. The U.S. in particular adopted a restrictive monetary policy in 1981/82 and from 1987-89, as evidenced by table 3. Figure 1 depicts an index of money supply in the G-7 where the slope of the curve indicates the rate of growth. Tight monetary policy in the United States also forced many European

[3] Blanchard and Summers (1984).

TABLE 2: CENTRAL GOVERNMENT FINANCIAL BALANCES AS % OF GDP

YEAR	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
USA	-1.1	-2.3	-1.6	-1.2	-0.3	-3.4	-4.2	-2.7	-2.7	-1.5	-2.8	-2.6	-4.0	-6.0	-4.8	-5.3	-5.1	-3.3	-3.2	-2.7
JAPAN	-0.4	-0.2	-1.6	-1.6	-1.3	-4.8	-2.0	-6.2	-6.6	-5.4	-4.8	-4.5	-5.2	-4.9	-4.1	-3.7	-3.1	-1.9	-1.1	-0.8
ITALY	-5.1	-6.5	-7.5	-8.3	-7.3	-11.9	-8.5	-10.5	-13.5	-9.8	-9.5	-11.4	-13.4	-13.9	-13.2	-15.1	-12.3	-11.7	-11.6	-11.3
UK	1.8	-0.7	-2.7	-3.4	-4.6	-7.3	-5.7	-3.4	-5.2	-5.7	-4.7	-4.8	-3.4	-4.4	-3.2	-3.2	-1.9	-0.8	1.1	1.3
FRANCE	0.5	-0.4	0.7	0.4	0.4	-2.6	-1.0	-1.2	-1.4	-1.5	-0.1	-2.3	-3.4	-3.5	-2.7	-2.7	-3.3	-1.4	-2.2	-1.7
GERMANY	1.0	0.8	0.7	1.4	-0.7	-3.6	-2.8	-2.1	-2.1	-2.0	-1.8	-2.4	-2.0	-2.0	-1.8	-1.1	-0.9	-1.1	-1.5	-0.4
CANADA	-1.1	-2.0	-1.6	-1.3	-1.3	-3.3	-3.2	-4.3	-4.9	-3.8	-3.5	-2.4	-5.6	-6.2	-6.5	-6.0	-4.0	-2.5	-2.9	-2.8
G-7	-0.7	-1.7	-1.5	-1.4	-1.2	-4.3	-3.7	-3.6	-4.1	-3.1	-3.4	-3.6	-4.6	-5.6	-4.7	-4.9	-4.3	-3.0	-2.7	-2.4

SOURCE: GDP AND EXCHANGE RATES ARE ALL FROM IFS. CENTRAL GOVERNMENT'S DEFICITS ARE FROM IFS EXCEPT FOR JAPAN OVER 1980-89; UK OVER 1988-89; AND FRANCE AND GERMANY IN 1989 THAT ARE FROM OECD'S ECONOMIC OUTLOOK.

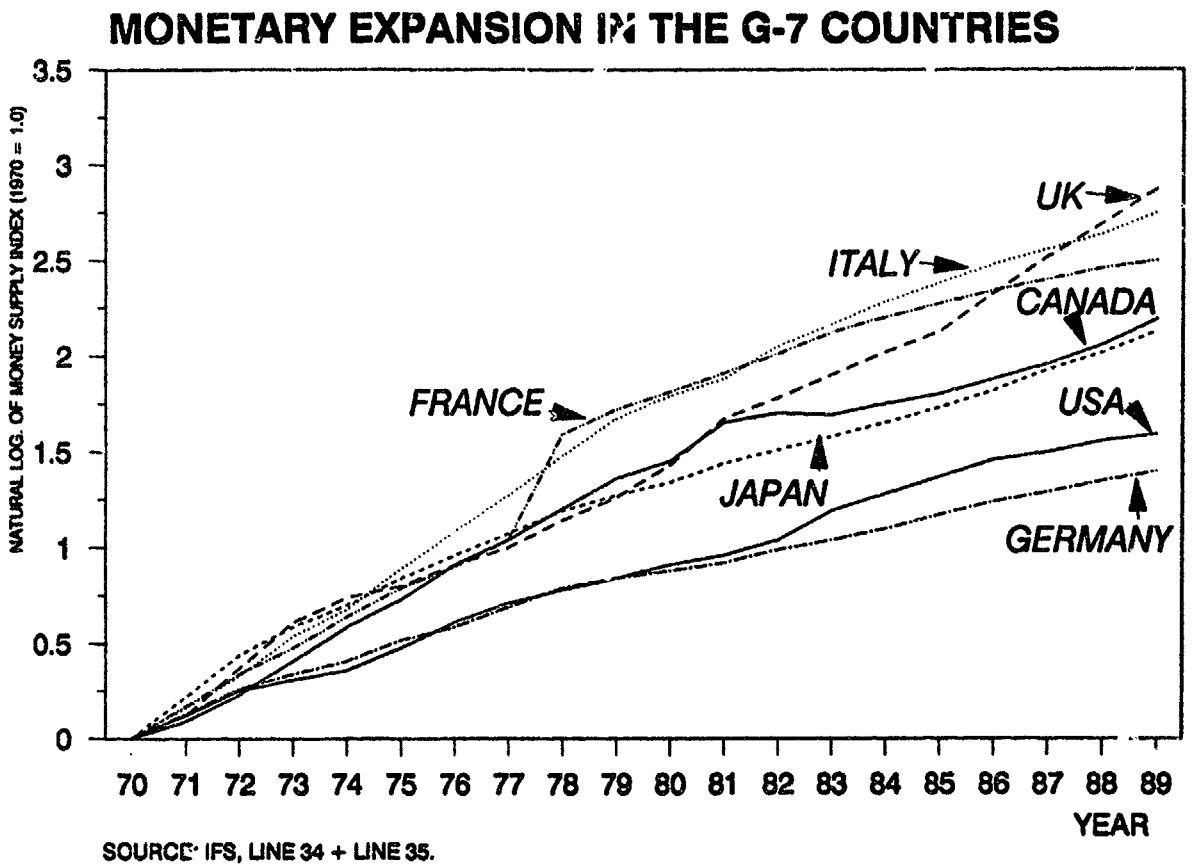
TABLE 3: MONETARY EXPANSION IN G-7 COUNTRIES (ANNUAL GROWTH RATE OF MONEY SUPPLY, IN % POINTS)

	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
USA	13.2	12.9	6.5	5.4	12.7	13.7	10.6	7.7	6.2	7.1	4.7	8.7	16.3	9.1	9.6	9.0	4.0	6.1	3.8
JAPAN	24.3	24.7	16.8	11.5	14.5	13.5	11.1	13.1	8.4	6.8	10.7	7.6	6.9	6.9	8.9	9.3	11.2	9.8	11.8
ITALY	17.2	19.0	23.1	14.5	23.6	20.6	21.7	22.8	20.7	12.7	9.9	18.3	12.2	12.3	11.1	9.6	8.6	8.8	11.5
UK	13.2	27.9	27.5	12.9	7.1	11.6	9.5	14.6	12.5	18.5	27.8	11.3	12.8	12.4	11.5	22.1	21.1	19.3	19.7
FRANCE	18.4	18.9	14.6	17.8	15.7	12.3	14.6	72.6	14.4	9.7	10.5	11.0	11.0	8.6	6.8	7.6	6.5	5.6	4.8
GERMANY	13.4	14.0	8.8	7.2	11.5	7.6	10.3	10.3	5.2	4..	..7	6.9	5.7	5.6	8.0	6.5	6.0	5.8	5.1
CANADA	9.1	15.0	20.6	19.2	15.4	19.2	14.0	16.9	17.7	9.5	22.4	5.0	-0.9	6.0	5.3	7.9	8.7	10.6	13.5

SOURCE: INTERNATIONAL FINACE STATISTICS (IFS), IMF.

NOTE: MONEY SUPPLY IS DEFINED AS THE SUM OF MONEY (M1) AND QUASI-MONEY (IFS LINES 34 + 35).
UK'S DEFINITION OF MONEY CHANGED IN 1987 BUT FOR CONSISTENCY, THE OLD DEFINITION WAS USED FOR 1987 AND 1988.
COMPARABLE DATA WERE NOT AVAILABLE FOR 1989; WE APPLIED THE GROWTH RATE ACCORDING TO THE NEW DEFINITION.
FRENCH DATA REFLECT INSTITUTIONAL CHANGES IN DECEMBER 1977. DATA FROM 1978 ARE BASED ON THE NEW REPORTING SYSTEM.

Figure 1:


MONETARY EXPANSION IN THE G-7 COUNTRIES
NATURAL LOG. OF MONEY SUPPLY INDEX (1970 = 1.0)
3.5
3
2.5
2
1.5
1
0.5
0
UK
ITALY
CANADA
FRANCE
USA
JAPAN
GERMANY
70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89
YEAR
SOURCE: IFS, LINE 34 + LINE 35.

countries to adopt contractionary monetary policies at various points in time in order to defend their exchange rates.

Although tight monetary policies can maintain short run interest rates above their equilibrium level, in the long run money is neutral and should have no effect on real rates. Econometric studies of the relationship between monetary policy, interest rates and output have found significant effects for periods ranging from two to three years.[4] However, the evidence from stock markets does not support the view that monetary policy is responsible for high real interest rates in the recent period. Stock market prices have risen while rates of return have fallen according to figure 2 and table 4, in contrast to what would be expected when tight monetary policies are the cause of high interest rates.

2.3. Shortage of Global Savings

There is no doubt that saving rates have declined in all of the G-7 economies, which constitute approximately 55% of global savings. Figure 3 shows the sharp drop in savings rates in the first half of the 1980s and the partial recovery in the latter half of the 1980s. The decline in household savings ratios was partly offset by a rise in business savings; however, government savings declined in several countries.[5] The aggregate decline in savings was fueled largely by the United States, although savings rates also fell in the United Kingdom, France, Italy and Canada. Savings rates fell by more than investment rates in the United States, the United Kingdom, France, Italy and Canada over the 1970-1990 period.

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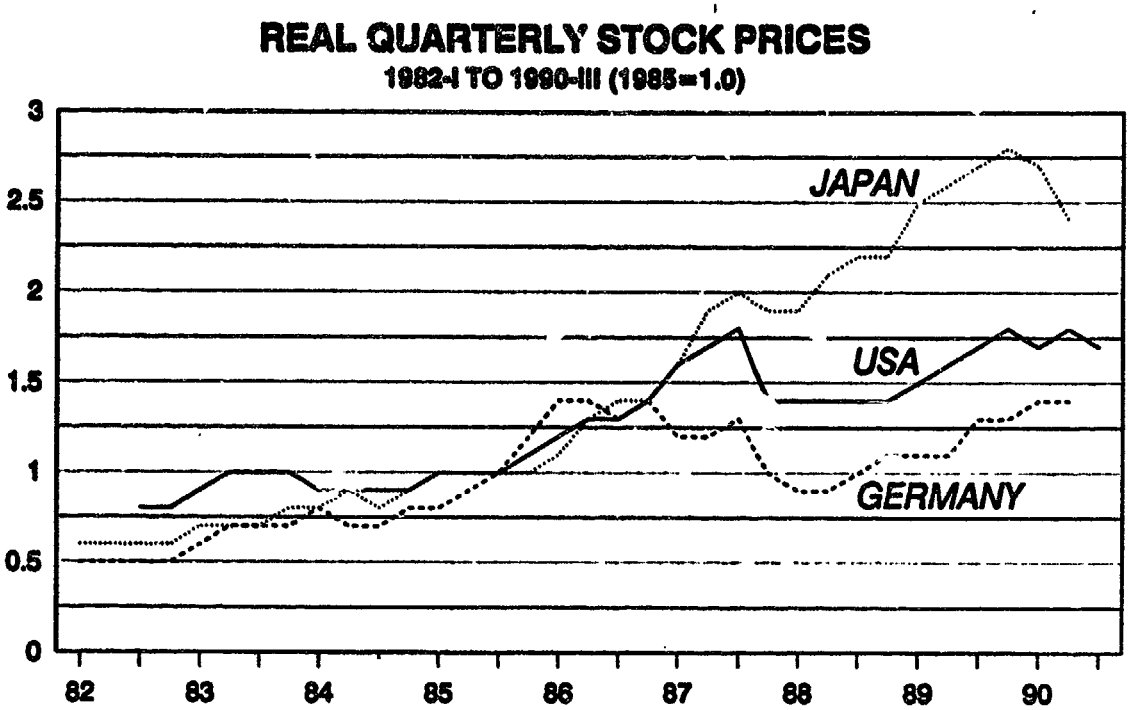
[4] Blanchard and Summers (1984) review this evidence.

[5] Dean (1990).

Figure 2:



Source: Stock prices from DRI;
GNP deflators from IMF.

Table 4:

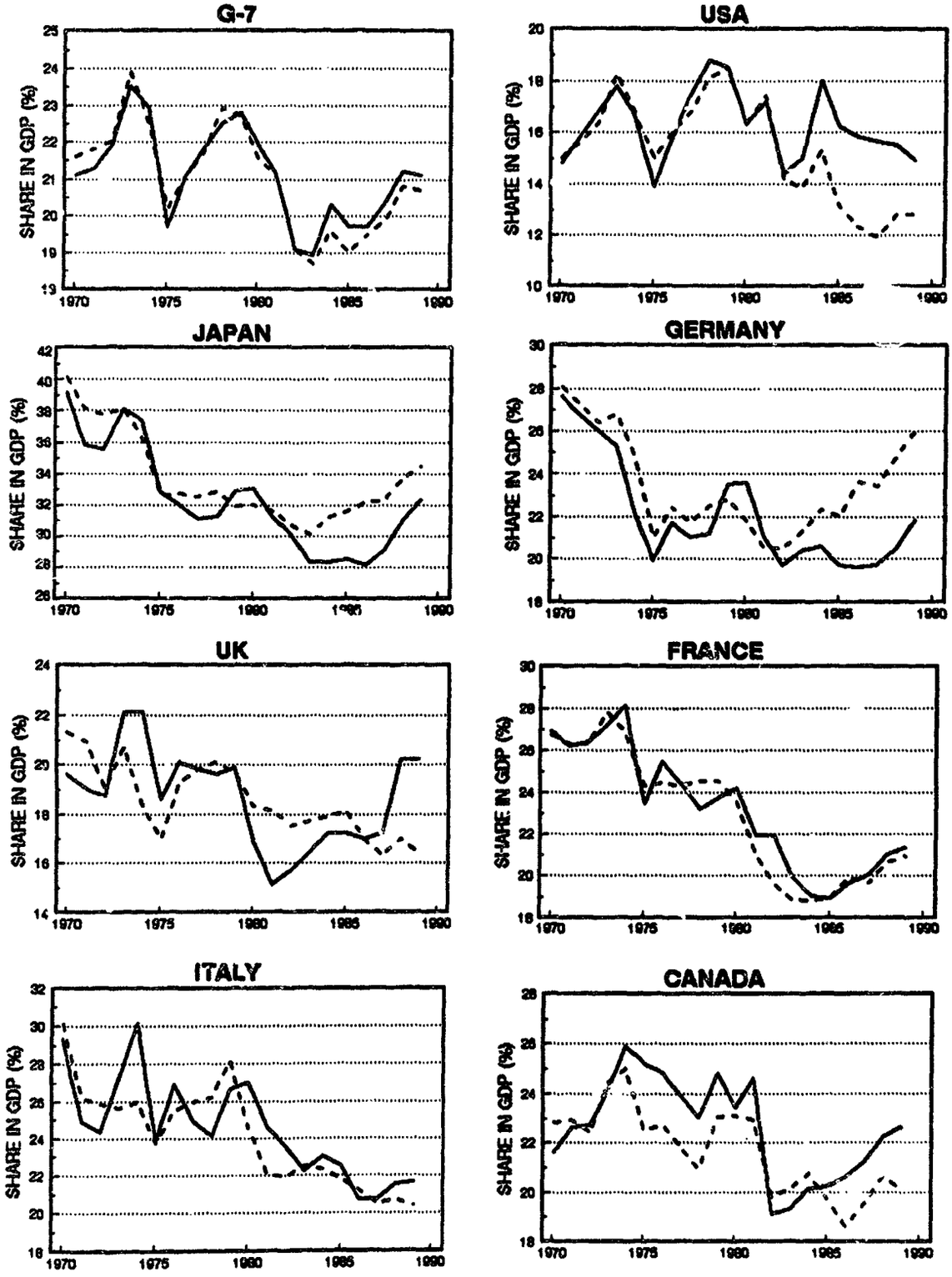
Stock Yields (%) (Year end)

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
(United States)	4.9	5.8	5.0	4.5	4.7	3.8	3.6	3.8	3.7	3.3
(United Kingdom)	6.4	6.1	5.5	4.8	4.5	4.4	4.2	4.6	5.0	4.5
(W. Germany)	7.4	6.3	4.9	3.7	3.9	2.7	2.8	4.5	3.6	2.9
(France)	6.4	8.6	7.7	4.7	4.4	3.4	2.5	3.9	2.8	2.7
(Japan)	2.0	1.7	1.7	1.3	1.1	1.0	0.7	0.6	0.5	0.4
(Canada)	3.9	4.6	3.9	3.2	3.6	3.1	2.9	3.2	3.4	3.1
(Holland)	6.8	7.7	7.4	5.0	4.5	4.5	4.7	5.6	4.6	4.3
(Australia)	3.6	4.9	5.3	3.6	4.8	4.0	3.4	4.2	4.9	3.2
(Hong Kong)	2.6	3.8	7.7	5.8	4.7	3.7	3.1	4.4	4.3	5.0
("World")	4.	5.0	4.5	3.8	3.8	3.2	2.6	2.6	2.4	2.2

Source: "Manual of Securities Statistics, 1990"
Nomura Securities Co., Ltd., Tokyo, Japan

Figure 3:

NATIONAL SAVING AND INVESTMENT RATES IN G7 COUNTRIES, 1970-89



- - - Saving as % of GDP
_____ Investment as % of GDP

Source: IFS

The recovery in savings rates that started after 1985 can be attributed largely to Germany and especially to Japan where above average savings rates were achieved in the latter half of the 1980s. While current savings rates may appear low compared to the approximately 23% rates which prevailed in 1973-4 and 1979, they have nearly returned to the level of 21% in 1970. Nevertheless, savings rates in the 1980s were considerably lower than those which prevailed in the 1970s.

This decline in savings rates has been attributed to demographic and social factors and to financial market liberalization. In the context of a life cycle model of consumption, demographic shifts can result in falling savings rates which can bring about higher rates of interest. The population of the OECD is increasingly elderly while that of the developing world is increasingly young, both of which are groups that have low savings propensities.[6] Thus the shortage of global savings reflects this demographic shift that has reduced the relative size of high-saving middle aged types in the world population. Table 5 shows the increasing old age dependency ratio for selected OECD economies. This has coincided with a decline in the young age dependency ratio. In contrast, in the low and middle income developing countries, approximately 36% of the population were below 15 years of age in 1988. Nevertheless, the proportion of the population under 15 and above 65 in the low and middle income countries has declined from 45% in 1960 to approximately 40% in 1988.[7]

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[6] Lal and van Wijnbergen (1986). Bovenburg and Evans (1989) found that demographic factors were the most important in explaining the decline in U.S. savings.

[7] World Bank, 1990.

Table 5:

DEMOGRAPHIC AND SOCIAL FACTORS INFLUENCING HOUSEHOLD SAVING

	Old age dependency ratio[a]	Young age dependency ratio[b]	Participation rate: > 65	Population growth	Participation rate: women
1962-1970					
United States	15.8	49.5	16.7	1.2	45.5
Japan	9.5	37.7	35.6	1.1	56.4
Germany	18.9	35.0	12.4	0.6	48.5
United Kingdom	19.3	36.8	12.6	0.5	49.2
Canada	13.0	54.6	14.3	1.7	..
Australia	13.6	47.4	12.1	1.9	..
Finland	12.7	41.2	8.8	0.3	61.9
1971-1980					
United States	16.4	38.8	13.2	1.0	54.1
Japan	11.8	35.4	28.0	1.2	53.5
Germany	22.6	32.5	6.8	0.0	49.4
France	21.5	37.7	8.6	0.6	51.7
United Kingdom	22.4	36.3	8.6	0.1	55.0
Canada	13.4	40.3	9.4	1.2	50.5
Australia	13.9	42.4	8.9	1.3	49.3
Finland	16.0	32.7	10.9	0.4	66.2
Netherlands	16.9	38.8	4.2	0.8	..
Norway	22.7	36.7	15.5	0.4	58.9
Sweden	23.6	31.8	7.5	0.3	67.5
1981-1986					
United States	17.7	33.1	10.8	1.0	62.6
Japan	14.5	32.9	25.1	0.6	56.7
Germany	21.7	23.2	3.6	-0.2	50.2
France	20.2	33.0	3.6	0.4	54.7
Italy	19.1	27.3	5.8	0.3	40.4
United Kingdom	23.1	30.2	5.3	0.1	58.8
Canada	14.9	32.3	7.5	0.8	61.1
Australia	15.3	36.6	5.1	1.4	53.3
Finland	18.2	28.8	5.0	0.5	72.7
Netherlands	17.6	30.1	1.8	0.5	40.0
Norway	24.2	32.4	12.6	0.3	66.5
Spain	18.3	37.4	4.9	0.5	32.8
Sweden	26.3	28.7	4.4	0.1	76.7

a/ Population 65 years and over as a per cent of the working-age population.
b/ Population under 15 years as a per cent of the working-age population.
Source: OECD, *Labour Force Statistics.*

In addition, financial market liberalization has had the effect of reducing household liquidity constraints and increasing household debt/income ratios. This has facilitated consumer borrowing against items such as home equity, thereby reducing the need for saving for major purchases. This phenomenon has been particularly important in the United States, the United Kingdom, and Canada and may become increasingly important in Japan with the introduction of more liberal financial market regulations. Moreover, tax policies in many countries, such as taxation of interest income and preferential treatment of owner-occupied housing, result in a bias against savings. Combined with the easing of household credit constraints, these tax policies have encouraged growth in debt-financed consumption.

2.4. Investment Boom

Instead of being constrained by the supply of savings, high interest rates may be reflecting increased investment demand as a result of rising profitability. Investment rates have closely followed savings rates in the G-7 as a whole, as evidenced by figure 3, but investment did exceed savings in the latter half of the 1980s.[8] This was the result of higher investment rates in the United States and, to a lesser extent, in the United Kingdom, France, Italy and Canada. Although investment rates also rose in Japan and Germany, they did not increase by as much as their savings rates.

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[8]Although investment rates did exceed savings rates in the 1980s, they were still lower than investment rates in the 1970s.

If high interest rates are being caused by a decline in world savings, as opposed to a rise in investment demand, one would expect equity prices to fall. However, stock prices rose in real terms throughout the 1980s in the majcr economies, as evidenced by figure 2. This implies higher expected future profits, which would seem to support the view that interest rates were driven by investment demand. The only exception to this is Japan where the stock market declined sharply in the third quarter of 1989. Thus for the 1980s, the evidence seems to point to an across the board rise in profitability in the G-7 that may have contributed to higher interest rates as a result of investment demand.

2.5. Increased Risk Premia

Another view is that while the underlying true rate of interest has not changed, higher risk premia have resulted in higher real interest rates. These increased risk premia have often been attributed to increased volatility in the world economy, particularly that associated with exchange rates. The difficulty in assessing this view is in measuring the risk premium. In order to evaluate the evolution of risk premia it is necessary to have estimates of both expected inflation and of the true cost of borrowing that underlies the nominal interest rate.

While exchange rates have certainly been more volatile during the 1980s, other features of the world economy, such as commodity prices, output growth, world trade, short term interest rates and inflation, have been considerably less volatile compared to the 1970s (see table 6). In addition, forward markets for hedging risk associated with exchange rates, as well as risk associated with interest rates and commodity prices, evolved considerably during the 1980s. The increased

Table 6:

INSTABILITY IN THE WORLD ECONOMY, 1953-1987
(Percent deviation from mean[a])

Global Economic Variables	1953-1962	1963-1972	1973-1980	1981-1987
Commodity Prices ($)				
IMF Total Index	5.06	4.44	12.58	7.40
IMF Food Index	2.24	4.51	11.94	12.35
IMF Agricultural Raw Materials Index	3.38	3.40	21.28	5.31
IMF Oil Prices	11.27	11.06	38.22	19.42
IMF Minerals Index	3.42	6.39	14.64	7.47
IMF Manufactured Goods Export Unit Value Index	3.54	8.26	20.14	7.43
Gross Domestic Product				
Industrial countries	7.96	10.42	5.88	5.74
Developing countries	8.35	14.24	10.01	2.96
GDP Deflator (Wholesale prices)				
Industrial countries	3.65	6.64	15.78	3.68
Developing countries	18.65	21.52	44.77	57.19
World Trade (Export Value)				
Industrial countries	12.62	29.09	30.14	10.90
Developing countries	11.77	21.70	32.28	6.51
Terms of Trade				
Industrial countries	3.40	1.11	3.48	5.26
Developing countries	5.64	2.03	8.77	7.33
Exchange Rates (Spot)				
$-Deutsch Mark	1.77	7.22	15.69	17.66
$-Yen	0.24	5.24	13.46	21.17
$-Pound	3.98	7.08	9.44	13.22
Short-Term Interest Rates				
New York	11.67	14.49	17.92	10.55
London	18.28	19.91	27.04	26.16
Industrial Share Prices				
New York	23.00	21.33	25.46	30.74
London	5.10	10.97	9.03	20.97

[a]Based on Annual Data, $PDM = \frac{1}{n} \Sigma \left(Y - \overline{Y} / \overline{Y} \right) \times 100\%$

Source: International Monetary Fund, various publications, Washington, DC; and Organization for Economic Cooperation and Development, various publications, Paris.

Labys and Maizels (1990)

availability of such instruments partially offset the increases in volatility associated with exchange rate movements.

An extension of this view is that high interest rates feed on themselves since indebted countries have greater difficulty in servicing their debt and therefore become less creditworthy and subject to higher risk premia.[9] Although risk premia are probably related to debt stocks, it seems unlikely that developing country borrowers, which constitute a small share of total borrowing on the world market, are the ones driving up world interest rates. Moreover, the observed high interest rates apply to both developing and industrial country borrowers, although many developing countries pay relatively higher risk premia.

3. Some Empirical Evidence

The first question that must be addressed empirically is whether high real rates of interest are inconsistent with high rates of growth in the long run. This will provide an indication of whether high real interest rates matter for growth as well as what might be the causes of high interest rates. To address this question, the literature on cointegration testing, which provides a statistical test for the existence of a long run equilibrium relationship, will be used. Cointegration testing does not address the issue of the direction of causality; rather, if some linear combination of two (or more)

[9] Bismut (1990).

time series produces a "white noise" error, those series are said to be cointegrated, thereby implying the existence of an equilibrium relationship.[10]

3.1. The Data

The interest rate used was an annualized 3 month US$ LIBOR. In theory, long term interest rates should matter for growth more than short term rates. However, because of the difficulties in measuring medium and long term inflationary expectations, the empirical literature tends to focus on short term rates. Moreover, because agents can switch maturities relatively easily in financial markets, the evolution of short term interest rates is probably an adequate indicator of longer term rates.

The use of LIBOR as a proxy for the world interest rate assumes that because of increased financial market integration, there is growing convergence of global capital costs.[11] This is confirmed by a recent study by Kugler and Neusser which analyzes the equality of ex post real interest rates in a multivariate time series framework using cointegration testing. Their results indicate that, although real interest rates are not equalized in the short run, they do tend to converge

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[10] For a survey of the literature, see a special issue of the Oxford Bulletin of Economics and Statistics with articles by Hendry (1986), Granger (1986), Hall (1986), Jenkinson (1986); as well as work by Dolado and Jenkinson (1987), Engle and Granger (1987).

[11] This is abstracting from movements in exchange rates. Frankel (1989) has shown that international integration of financial markets has all but eliminated covered interest rate differentials for the major industrial countries, although real and nominal exchange rate variability remain.

in the long run.[12] This implies that governments have reduced autonomy in setting domestic interest rates and maintaining an independent monetary policy. Similarly, Barro and Sala i Martin (1990) found that, for ten OECD countries, the expected real interest rate for each individual country depends primarily on world factors rather than own-country factors, further confirming the hypothesis of international financial market integration.[13]

In order to test the validity of the assumption of international financial market integration, a separate analysis is conducted for the U.S. to determine whether the findings change substantially when the relationship between interest rates and growth rates are analyzed within an individual country. The interest rate used for the U.S. is that on three month Treasury bills and the growth rate is that of real GNP. The U.S. sample uses quarterly data for the 1957-90 period.

In order to measure real interest rates, it is necessary to derive an empirical proxy for inflationary expectations. A number of different techniques have been used in the literature.[14] The problem with choosing between the various estimated alternatives for expected inflation is that the

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[12] The countries studied were: the United States, Japan, the United Kingdom, the Federal Republic of Germany, France, and Switzerland. The authors analyzed the period from 1978 to 1989 using monthly data and a variety of lag lengths to capture the short and long run. The one exception to real interest rate convergence in the long run is Switzerland where the rate is consistently lower than in other countries. The explanation seems to be the political and economic stability of the Swiss economy as well as the anonymity associated with international capital flows to Switzerland. Kugler and Neusser (1990).

[13] The only exceptions were Japan and the United Kingdom where own country variables were also significant, reflecting some degree of isolation from international markets over the 1959-88 period.

[14] The types of proxies for inflationary expectations that have been used are: a three year moving average of actual rates, inflation forecasts from private forecasting companies, and autoregressive estimates of expected inflation.

results vary considerably depending on the technique chosen.[15] Instead, the rational expectations hypothesis will be used here on the assumption that the difference between expected and actual inflation rates is a serially uncorrelated random error. Therefore, realized inflation rates based on one-quarter forward inflation of the GDP deflator were used to derive real rates of interest.

For the industrial countries, output growth was defined as the real growth rate of GDP in the G-7.[16] The G-7 data is quarterly for the period 1970-1990. For the developing countries, output growth is defined as the real growth in GDP of the low and middle income countries. The developing country data are annual for the 1970-1989 period. The movement of real output growth in the OECD and in the low and middle income countries and ex post real interest rates are described in figure 4.

3.2. Time Series Properties: Testing for Unit Roots

In order to avoid spurious correlations associated with trended variables, the time series properties of the data must be analyzed. The test statistics in table 7 provide measures of the stationarity of the time series. Series that need to be differenced once to achieve stationarity are said

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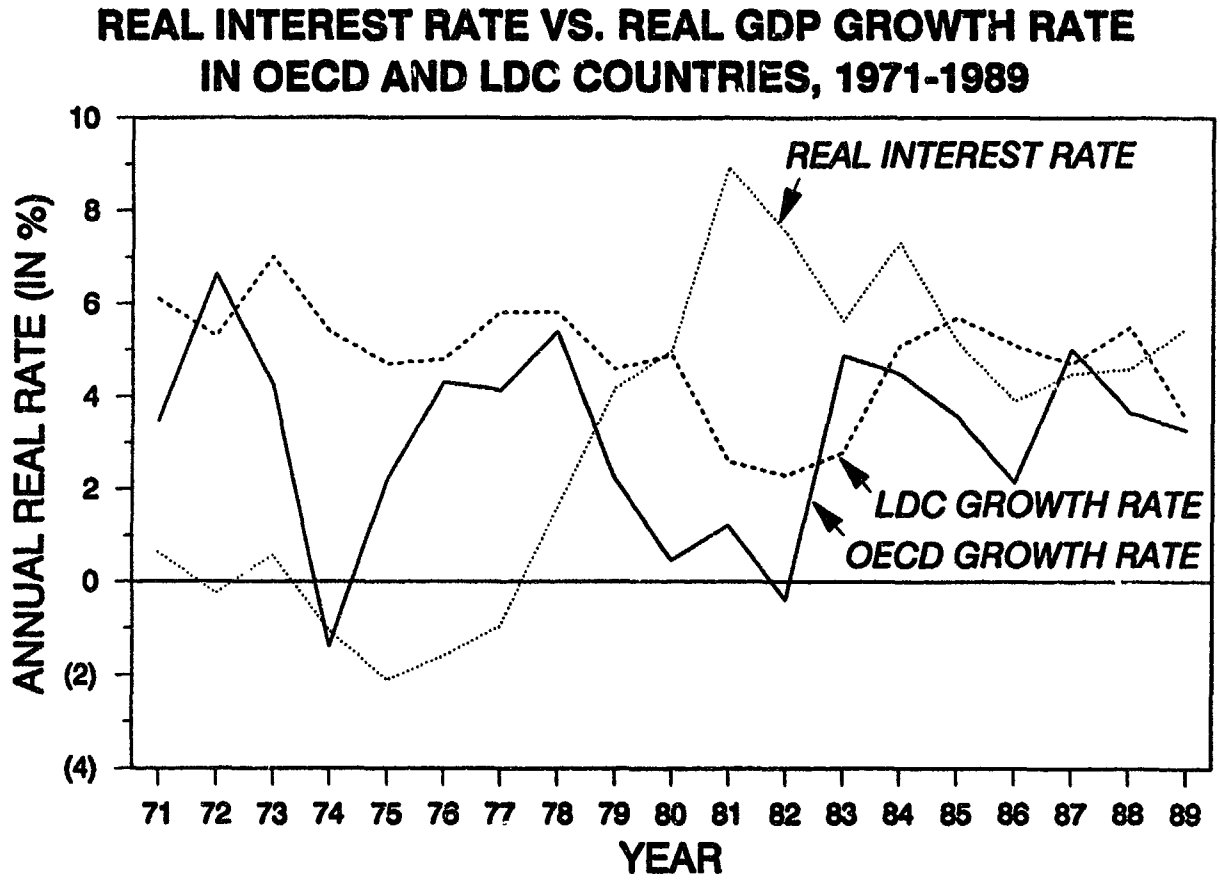
[15] For example, Blanchard and Summers use both DRI forecasts and a rolling autoregressive forecasts as proxies for expected inflation. Between 1980-83, DRI's forecast of Japanese inflation was 3.5% whereas their statistical forecast indicated that inflation would fall by 0.5%. For the period 1978-84, inflation in the United Kingdom was forecast to be 8.2% by DRI while the rolling autoregression forecast was only 2.3%. Blanchard and Summers, 1984.

[16] The G-7 consists of Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States. These seven economies together constitute approximately two-thirds of world GDP.

Figure 4:



Source: IFS and World Bank's Economic and Social Database

TABLE 7: TESTING FOR UNIT ROOTS: COINTEGRATING REGRESSION DURBIN WATSON (CRDW) TESTS, DICKEY-FULLER (DF) AND AUGMENTED DICKEY-FULLER TESTS (ADF)

	REAL INTEREST RATE	G-7 GROWTH RATE	ANNUAL REAL INT RATE	LDC GROWTH RATE	US REAL INTEREST RATE	US GROWTH RATE
CRDW						
HO:I(0)	0.16	0.26	0.25	0.93	0.17	1.39
HO:I(1)	1.90	1.24	1.80	1.64	1.93	2.84
HO:I(2)	2.52	2.63	2.91	2.55	2.64	3.33
DICKEY-FULLER (DF)						
HO:I(1)	-1.11	-1.37	-0.29	-1.29	-1.70	-6.18
HO:I(2)	-8.22	-5.71	-3.26	-3.34	-10.83	-18.13
DF & CONSTANT						
HO:I(1)	-1.91	-2.25	-1.09	-2.52	-2.33	-8.89
HO:I(2)	-8.17	-5.67	-3.32	-3.26	-10.80	-18.05
DF & CONSTANT & TIME						
HO:I(1)	-2.37	-2.23	-1.30	-2.39	-2.77	-9.02
HO:I(2)	-8.12	-5.63	-3.31	-2.90	-10.75	-17.99
AUGMENTED DICKEY-FULLER (ADF)						
HO:I(1)	-0.41	-2.30	-0.51	-1.18	-1.00	-2.91
HO:I(2)	-3.74	-4.42	-1.33	-2.81	-5.21	-8.03
ADF & CONSTANT						
HO:I(1)	-1.14	-3.11	-1.24	-2.69	-1.62	-5.62
HO:I(2)	-3.76	-4.39	-1.42	-2.75	-5.21	-8.00
ADF & CONSTANT & TIME						
HO:I(1)	-1.40	-3.09	-1.91	-2.72	-2.05	-5.76
HO:I(2)	-3.74	-4.36	-1.46	-2.48	-5.19	-8.00

CRITICAL VALUES: N=21: CRDW=1.069; N=51: CRDW=0.493; N=101: CRDW=0.259.
N=25: DF = 2.61; DF+C = 3.20; DF+C+T = 2.85.
N=50: DF = 2.56; DF+C = 3.14; DF+C+T = 2.81.
N=100: DF = 2.54; DF+C = 3.11; DF+C+T = 2.79.

CRITICAL VALUES FOR THE DF AND ADF TESTS ARE THE SAME.

NOTE: ADF TEST FOR THE QUARTERLY DATA IS BASED ON FOUR LAGS OF THE RIGHT HAND SIDE VARIABLE WHILE THAT FOR THE ANNUAL DATA INCLUDES TWO LAGS.

to be I(1), whereas those that must be differenced twice are referred to as I(2).[17] The results are somewhat mixed. The Cointegrating Regression Durbin Watson (CRDW) statistic indicates that all the series, except the U.S. real interest rate, are I(1). The Dickey-Fuller (DF) and Augmented Dickey-Fuller (ADF) tests are sensitive to whether a constant and/or time trend are included, so they are reported separately for each. The DF and ADF tests seem to imply that the real interest rate, and to a lesser extent the G-7 and LDC growth rates, are I(2). The weak power of these tests hasbeen widely acknowledged.[18] The subsequent econometric analysis will be conducted for both hypotheses of stationarity so that the results are not contingent on the hypothesis about the time series properties of the data.

3.3. Cointegrating Vectors

The cointegrating vectors for output and interest rates are presented in table 8. Equations 1-6 are for the G-7, equations 7-8 are for the low and middle income countries, and equations 9 and 10 are for the United States. Each equation is presented for the hypothesis that the series are I(1) and I(2) which is reflected in the degree of differencing. Evidence of cointegration includes an R2 that is close to unity, significant coefficients, a significantly non-zero CRDW statistic and significant DF and ADF tests on the residuals from the regression.

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[17] All of the series were tested to determine whether they were stationary without differencing, but this was not found to be the case.

[18] See Jenkinson (1986).

TABLE 8: COINTEGRATING VECTORSFOR THE LOW AND MIDDLE-INCOME COUNTRIES IN EQUATIONS 7 AND 8, AND REAL OUTPUT GROWTH IN THE US IN EQUATIONS 9 AND 10

	G-7 COUNTRIES				DEVELOPING COUNTRIES				UNITED STATES	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	HO:I(1) LEVELS	HO:I(2) DIF	HO:I(1) LEVELS	HO:I(2) DIF	HO:I(1) LEVELS	HO:I(2) DIF	HO:I(1) LEVELS	HO:I(2) DIF	HO:I(1) LEVELS	HO:I(2) DIF
CONSTANT	3.22	-0.03	3.37	-0.07	3.39	-0.01	5.51	-0.12	0.84	0.00
	(9.94)	(0.28)	(8.97)	(0.33)	(3.63)	(0.06)	(17.17)	(0.41)	(7.84)	(0.04)
REAL INTEREST RATE	-0.04	0.22	0.23	0.23	-0.11	0.21	-0.22	-0.08	-0.05	0.05
	(0.57)	(2.51)	(1.47)	(1.39)	(0.68)	(2.27)	(3.13)	(0.43)	(1.39)	(0.44)
R SQUARED	0.69	0.08	0.71	0.05	0.71	0.12	0.97	0.03	0.37	0.00
CRDW	0.27	1.30	0.28	1.26	0.30	1.21	1.49	2.11	2.85	3.33
F	83.52	3.17	43.78	0.97	46.73	2.59	218.18	0.21	38.08	0.10
DF	-2.31	-5.95	-1.38	-3.78	-1.62	-4.42	-2.66	-3.10	-9.07	-17.90
ADF(4)	-3.17	-4.35	-2.59	-2.96	-2.04	-2.88	-3.23	-2.54	-5.58	-7.82

NUMBERS IN PARENTHESES ARE T STATISTICS.

Equation 1 is the regression of the level of G-7 output and interest rates on the assumption that the series are I(1). The insignificance of the interest rate as well as the poor cointegration statistics imply that there is no long run relationship, especially given the fact that the "t" statistics are biased upwards because of autocorrelation of the residuals.

The interest rate is significant in equation 2, which is in first differences, but has a positive sign.

In order to test the hypothesis that the 1980s represented a structural break in terms of the relationship between interest rates and growth, the sample was split and the equations reestimated. Equations 3 and 4 imply that there was no evidence of an equilibrium relationship during the 1970s either. Similarly during the 1980s, real interest rates did not have a negative effect on growth.

For the developing countries, equation 7 indicates a significantly negative relationship between world interest rates and growth rates and significant cointegration statistics. Equation 8, under the hypothesis that the series are I(2), shows no significant relationship. For the U.S., equation 9 has a negative but insignificant coefficient on the interest rate while equation 10 under the hypothesis of I(2) series is completely insignificant.

3.4. Unrestricted Dynamic Modelling

An alternative to the above tests of cointegration is the estimation of a full dynamic model. Engle and Granger have shown that all cointegrated series can be represented by an error correction process and series that follow an error correction model can be said to be cointegrated.[19] Thus an

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[19] Engle and Granger (1987).

alternative test of the existence of a cointegrating equilibrium is to estimate a dynamic model to see if it is of an error correction form such as:

$$\Delta Y_y = a_1 \Delta r_t + a_2 (Y_{t-1} - r_{t-1}) + a_3 \Delta Y_{t-1}.$$

An unrestricted dynamic modeling strategy was followed whereby the most general model was simplified according to variable significance.[20] Four lags of the independent and dependent variables were included for the quarterly data on the G-7 and the U.S. and then reparameterized until the most parsimonius characterization of the data generating process was obtained. The unrestricted estimates are equation 9, 11 and 19 in table 9 and the resulting reparameterizations in equations 10, 12, and 20.[21] Although the interest rate (R) is significant in equation 10, it has a positive sign. Moreover, the lagged level of the interest rate (R(-1)) which constitutes part of the error correction term is insignificant, thereby indicating that the relationship is not of the error correction form. The reparameterization in equation 12 has significant and appropriately signed components of the error correction term (Y(-1) and R(-1)), but the interest rate (R) is insignificant, again rejecting the error correction form. Similarly in equation 20 for the United States, both R and the lagged level R(-1) are insignificant.

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[20] See Hendry and Richard (1983) for a discussion of this methodology.

[21] The results for the hypothesis of I(2) for the U.S. are not reported here given the poor performance of equation 10 in table 8.

TABLE 9: ERROR CORRECTION MODELS OF OUTPUT GROWTH AND INTEREST RATES

	G-7 ECONOMIES				DEVELOPING ECONOMIES				UNITED STATES	
	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
	HO:I(1)		HO:I(2)		HO:I(1)		HO:I(2)		HO:I(1)	
	UDE	REPARAM	UDE	REPARAM	UDE	REPARAM	UDE	REPARAM	UDE	REPARAM
C	0.70	0.77	0.00	-0.01	5.13	5.27	0.05	0.04	0.68	0.71
	(2.59)	(3.51)	(0.03)	(0.06)	(2.61)	(2.93)	(0.16)	(0.14)	(4.28)	(5.87)
R	0.18	0.26	0.21	0.13	-0.12	-0.13	-0.21	-0.17	0.06	0.07
	(2.11)	(3.40)	(2.26)	(1.49)	(0.71)	(0.80)	(1.10)	(0.94)	(0.62	(0.78)
DY(-1)	0.25	0.30	0.00		0.32	0.34	0.28		-0.07	
	(2.33)	(2.93)	(0.02)		(1.09)	(1.23)	(1.03)		(0.49)	
DY(-2)	0.28	0.29	0.20						0.08	
	(2.44)	(2.57)	(1.33)						(0.67)	
DY(-3)	0.20		0.30	0.23					0.03	
	(1.60)		(2.20)	(2.34)					(0.26)	
DY(-4)	-0.14		0.06						0.04	
	(1.20)		(0.48)						(0.51)	
DR(-1)	0.06		0.82	0.63	-0.04		0.27	0.25	-0.05	
	(0.66)		(3.69)	(3.75)	(0.23)		(1.49)	(1.39)	(0.55)	
DR(-2)	-0.17		0.61	0.41					-0.26	-0.19
	(1.75)		(3.16)	(3.48)					(2.49)	(2.09)
DR(-3)	-0.08		0.41	0.28					-0.06	
	(1.02)		(3.06)	(3.30)					(0.57)	
DR(-4)	-0.22	-0.18	0.15						-0.11	
	(2.72)	(2.41)	(1.58)						(1.10)	
Y(-1)	-0.21	-0.23	-0.89	-0.75	-0.94	-0.96	-1.29	-1.01	-0.75	-0.77
	(3.04)	(4.34)	(4.69)	(6.94)	(2.70)	(3.01)	(3.22)	(3.39)	(5.03)	(9.42)
R(-1)	-0.02	-0.03	-0.60	-0.48	-0.21	-0.22	-0.54	-0.49	-0.04	-0.06
	(0.59)	(0.92)	(2.24)	(2.00)	(1.78)	(2.11)	(1.87)	(1.72)	(0.94)	(1.56)
R SQUARED	0.51	0.46	0.57	0.52	0.46	0.45	0.63	0.59	0.47	0.44
DW	2.11	2.21	1.86	2.20	1.92	1.86	1.98	1.78	2.00	2.06
F	5.18	7.84	6.44	8.48	1.54	1.99	2.56	2.84	8.47	19.19

FOR HO:I(1), THE LEFT HAND SIDE VARIABLE IS THE FIRST DIFFERENCE OF REAL OUTPUT GROWTH.
FOR HO:I(2), THE LEFT HAND SIDE VARIABLE IS THE SECOND DIFFERENCE OF REAL OUTPUT GROWTH.
THE DIFFERENCED RIGHT HAND SIDE VARIABLES ARE ALSO SECOND DIFFERENCES.

For the developing countries, one lag of the dependent variable and of the independent variable were included of the annual data in the unrestricted equations 13 and 15 to preserve degrees of freedom. The reparameterizations in equations 14 and 16 reject the error correction model because of the insignificance of the interest rate term. This was further confirmed by the use of a two stage procedure proposed by Engle and Granger for estimating error correction models.[22]

The results in table 9 confirm the findings of the earlier cointegration tests. The error correction model was not accepted as an appropriate representation of the time series, thus implying that there is no clear long run equilibrium between real interest rates and real growth rates. Although usually insignificant, the interest rate term (R) was always positive in the industrial country equations and was always negative in the developing country regressions.

For the industrial countries there was some weak evidence of a positive relationship between interest rates and growth in table 8 and 9, which would seem to support the view that periods of rapid growth tend to coincide with high interest rates as a result of increased investment demand in response to higher profitability. There was also some evidence of a negative relationship between developing country growth and real international interest rates in equation 7 of table 8. This may be because investment by developing countries, particularly by the public sector, may be more constrained by international borrowing than that in industrial countries. The results for the United States are broadly consistent with those for the G-7, thereby implying that markets are fairly integrated internationally.

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[22] Engle and Granger (1987) and Hall (1986).

3.5. Conclusions from Econometric Analysis

The econometric analysis presented here would dispute the existence of consistent negative effects on growth resulting from high real interest rates. Thus periods of high real interest rates may coincide with periods of rapid growth and vice versa. The evidence for the industrial countries partly supports the view that high real interest rates may reflect periods of increased profitability or improved investment efficiency, even when investment rates decline. There may also be scope for greater externalities from investment in periods of high real interest rates because the opportunity cost of investment is high. For the low and middle income countries, there is some, albeit weak, evidence of a negative relationship. This may reflect their greater dependence on international borrowing for investment at the margin or the reduced scope for increased returns to investment because of human capital and institutional constraints. While periods of high interest rates may coincide with greater productivity in the industrial countries, the developing economies have little impact on the global outcome and must respond to a given external environment. Therefore, high real interest rates will probably affect developing countries that are highly indebted at variable interest rates and those that need to borrow further adversely. In contrast, developing economies that are outwardly-oriented can profit from increased exports as a result of rapid growth in the industrial countries. However, the net effect on the overall growth performance of the low and middle income countries is ambiguous.

4. Prospects for the 1990s

A number of individuals and institutions have warned of a further tightening of credit markets along with higher world interest rates in the 1990s.[23] Longer term government bond yields have already risen in a number of industrial countries. Greater demand as well as supply constraints are blamed for putting further upward pressure on interest rates.

On the demand side, the costs of financing German reunification may both drive up German interest rates and reduce the size of the current account surplus that has been available to finance the needs of deficit countries in the past.[24] This will be especially important if the German government uses bonds to finance its projected budget deficit of 5% of GDP rather than raise taxes which are perceived to have a more dampening effect on growth.[25] The reconstruction of Kuwait and Iraq will exert new pressures on the supply of global savings. A further source of increased demand will be Eastern Europe, although the magnitude is likely to be relatively small in a global context. In addition, the recent negotiations over the 1991 U.S. deficit reduction package may have undermined confidence that future deficits will be successfully lowered, despite the Gramm-Rudman

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[23] The Bank for International Settlements warned of the possibility of an "international credit crunch" because of large budget deficits, tight monetary policies, rising demand for capital from Eastern Europe and a slowdown in lending by Japanese and American banks. The Economist, October 20 1990, p. 81. Recent actions by the U.S. Federal Reserve to lower reserve requirements for banks are aimed at avoiding a credit squeeze.

[24] Estimates are that approximately DM40 billion ($26 billion) this year and DM60 billion for 1991 are needed to finance the east German budget deficit, meet social security needs, restructure industries, improve infrastructure and service the foreign debt. Estimates of the costs of unification until 1993/4 range from DM300-DM350 billion. As for the current account surplus, estimates by five major economic research institutes in Germany are that it will fall to only DM16 billion next year, compared to a current account surplus of DM104 billion in 1989 for West Germany alone. Marsh (1990).

[25] Marsh (1990).

legislation. Thus fears of future monetization of U.S. deficits may raise inflationary expectations and drive real interest rates even higher.

On the supply side, more restrictive lending practices may result from microeconomic problems in the banking sectors of many of the major economies in the wake of ongoing ldc debt problems, the savings and loan crisis and the financial instability of several major commercial banks. Thus far, this has been manifested largely in terms of an increase in the cost of funds to higher risk borrowers, particularly in the United States, the United Kingdom, Australia and Canada.[26] Should this become more severe, central banks may move to lower nominal interest rates to reduce the potential recessionary effects.

What does the above econometric analysis imply for the consequences of persistent high, or possibly even higher, real interest rates in the future? One implication is that ultimately high real interest rates may not matter for growth performance if more productive investment results. Thus it remains to be seen whether investment productivity will continue to rise in the 1990s. If there is a negative impact of higher interest rates on growth, it will probably affect the developing countries more adversely. This is not simply because the low and middle income countries are net debtors since the category includes some capital exporters, such as several of the oil producers, and the industrial country group includes the largest debtor of all, the United States. Rather, it seems to reflect the differing structural characteristics of industrial and developing economies.

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[26] Fidler, Hargreaves and London (1990).

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